Investigation of the essential oils of *Cinnamomum verum* Presl. grown at Lower Brahmaputra valley of Assam

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ABSTRACT

The essential oils, obtained by hydro-distillation of the leaf and stem bark of *Cinnamomum verum* Presl., grown at Pathshala area of Lower Brahmaputra valley, Assam were analyzed by GC and GC-MS. Ten and thirteen components, representing 99.84 and 87.12% of the total leaf and stem bark oils were identified, respectively. Eugenol (92.70%) was the predominant component in the leaf oil, while cinnamaldehyde (24.20) and benzyl benzoate (15.13) were the major components in the stem bark oil. The findings on comparison with those reported for the leaf and stem bark essential oils of *C. verum*, may draw into a conclusion that in an individual member of the species, higher the eugenol content of leaf is the lower the content of cinnamaldehyde in its stem bark oil and vice-versa.

INTRODUCTION

Cinnamomum verum Presl. syn. *C. zeylanicum* Blume (Lauraceae), is a small evergreen aromatic tree growing wild in the Southern coastal region of India and in Sri Lanka[1]. It is the source of cinnamon bark of commerce and is commercially valuable tree spices used for flavoring food stuff since antiquity[2,3]. Cinnamon is used in traditional systems of medicine for the treatment of rheumatism, neuralgia, headache, toothache, dyspepsia, flatulence, diarrhea, nausea, vomiting, menorrhagia, gonorrhea, tuberculosis and enteric fever[4,5]. The plant yields mainly two types of commercial essential oils. Bark oil rich in cinnamaldehyde is used in flavoring and perfumery industries, while the leaf oil containing eugenol as a major component used in seasoning and snacks[6].

Essential oils of *C. verum* native to different geographical locations have been investigated[7,8,9,10,11]. In the present investigation the leaf and stem bark essential oils of the said taxon grown in Lower Brahmaputra valley of Assam were analyzed.

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MATERIALS AND METHODS

The leaves and stem bark of *C. verum* were collected from a 12 years old plant grown in a home-stead garden of Pathshala area of Lower Brahmaputra valley, Assam. Voucher specimens (RRLJ 1829) were deposited in the Herbarium of North East Institute of Science & Technology (Regional Research Laboratory), Jorhat, Assam, India. Fresh leaves and ground stem bark were subjected to hydro-distillation, in Clevenger-type apparatus for 3 and 5 h respectively. The oils were dried over anhydrous Na_2SO_4 and stored in sealed glass vials under refrigeration.

GC analyses were performed using a Varion 3700 GC equipped with FID fitted with a 2.5 m X 2.2 mm stainless steel column packed with 15% SE-52 coated on 80/100 mesh Chromosorb W-HP. Nitrogen was used as carrier gas at a flow rate of 30 ml/min. The column temperature was programmed as 90° (12 min), 90°-220° (2°C/min) and 220°C (20 min).

GC-MS analyses were carried out with a Finnigan Matt INCOS 50 GC-MS/DC equipped with library search data of 42222 spectra using a DB-5 fused silica capillary column of 30 m X 0.25 mm (0.25 μm film thickness). The temperature was programmed as 75° (5 min); 75°-200° (5°C/min) and 200°C (15 min) with helium as carrier gas, an ion source temperature 180°C and an electron energy 70 eV. Component identification was done by comparison with reference compounds, by peak enrichment and by matching their 70 eV EI mass spectra with those of library search data.

RESULTS AND DISCUSSION

The leaf oil, obtained in 0.9% yield (v/w on Fresh Weight Basis) was a pale golden-yellow mobile liquid and heavier than water. The stem bark oil, obtained in 0.4% yield was a pale yellow mobile liquid. The leaf oil has clove-like smell and possessing a pungent and warm taste. The bark oil has spicy smell and possessing a mild pungent taste.

Ten components representing 99.84% of the leaf oil were identified. Eugenol alone constituted 92.70% of the oil followed by cinnamaldehyde and caryophyllene oxide with 2.15 and 1.40 respectively. In the stem bark oil, 13 components representing 87.12% of the total oil were identified. Cinnamaldehyde (24.20%) was the major component followed by benzyl-benzoate (15.13), caryophyllene (10.40) and eugenol (10.00). The other components identified were methyl isoeugenol (7.80) and linalool (6.30) (Table 1).

The leaf and stem bark essential oils of two individuals of *C. verum* (RRLJ 1622 and RRLJ 1620) grown in Jorhat area of upper Brahmaputra valley were studied[11]. In both the individuals eugenol (79.30 and 90.40 respectively) and cinnamaldehyde (70.90 and 60.70%, respectively) were reported as the major components in the leaf and stem bark oils, respectively. In the present study too, the leaf and stem bark essential oils of an individual of the species (RRLJ 1829) grown at Pathshala area of lower Brahmaputra valley of Assam were reported as eugenol (92.70) and cinnamaldehyde (24.20%) respectively as the major components.

The present findings on comparison with those reported (Table 2) for the essential oils of *C. verum*, grown as a whole in Brahmaputra valley of Assam may draw into a conclusion that in an individual member of the species higher the eugenol content of leaf is the lower the content of cinnamaldehyde in its stem bark oil and vice-versa. The conclusion drawn in the investigation is also supported by the findings reported[12].

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Table 1: Composition (in%) of leaf and stem bark essential oils of *Cinnamomum verum*

Composition	Leaf oil	Stem bark oil
p-cymene	0.09	1.50
1,8-cineole	0.40	2.14
Linalool	0.90	6.30
Cinnamaldehyde	2.15	24.20
Cinnamyl alcohol	--	t
Eugenol	92.70	10.00
Methyl eugenol	--	3.40
Methyl cinnamate	0.23	--
β-caryophyllene	1.02	10.40
Ethyl cinnamate	0.30	1.80
Methyl isoeugenol	--	7.80
Iso-eugenol	--	4.05
Eugenyl acetate	0.65	0.40
Benzyl benzoate	--	15.13
Caryophyllene oxide	1.40	--
Total	99.84	87.12

t < 0.05%

Table 2: Comparison of eugenol and cinnamaldehyde in leaf and stem bark oils of *Cinnamomum verum*

Reference	Eugenol in Leaf oil In %	Cinnamaldehyde in Stem bark oil In %
Lawrence[12]	70.1	75.0
* (RRLJ 1622) [11]	79.3	70.9
* (RRLJ 1620) [11]	90.4	60.7
Present * (RRLJ 1829)	92.7	24.2

*In parenthesis available Accession numbers of *C. verum*